# OCTOBER 2024 DATA SUMMIT

Hyatt Regency Orange County, CA

October 16-17, 2024

PESC®

PESC

# OCTOBER 2024 DATA SUMMIT

MATT BEMIS
SR. ASSOCIATE REGISTRAR, USC

DOUG HOLMES
MANAGER, E-TRANSCRIPTS, OUAC

JIM KELLY
PRINCIPAL, JIM KELLY TECHNOLOGIES

# PESC Updates: GEO Code, CanPESC, and JSON-LD Transcript

WEDNESDAY, OCTOBER 16, 2024

# Agenda

- GEO Code
- CanPESC
- JSON-LD Transcript

# PESC GEO Code – History & Background

## PESC GEO Code Standard & International Data Exchange

- GEO Code key underpinning resource to global data exchange (machine-to-machine) for secondary and postsecondary transcript information

## History of GEO Code – Why it was built and how it evolved

- Foundational PESC member postsecondary data exchange issue
- Many native indices for jurisdictions but no single global index
- 2016 – 2019 development/publication of the current PESC GEO Code standard

# PESC GEO Code – History & Background (cont'd)

**Where GEO Code is today –**

**And how far we have come thanks to the PESC Community**

- **192 countries are published as an index, including territories within those countries (Total 214 unique Country Codes)**
- **2017 tech stack grew with native indices crosswalk & community data participation**

**State of adoption of GEO Code – Who is using it and why it continues to grow in adoption across platforms**

- NACES members & Vendors exchanging EDI and XML data/files
- Institutions implementing international/global code set
- Countrywide or jurisdictional use, such as application processes or data collection

# PESC GEO Code – History & Background (cont'd)

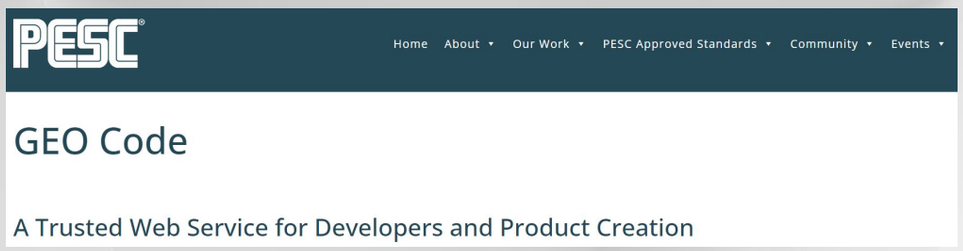
## What is on the Horizon for GEO Code?

- PESC Commitment to five-year review for country code index values through GDN, Ministries of Education, and PESC engagement
- PESC response to community requests for additions/updates
- PESC meetings & PESC GEO Code website, tech stack, and data standard updates in progress

# GEO Code User Group & Guiding Principles

- **PESC GEO Code User Group - https://pesc.org/geo-code/**

- **GEO Code Definition & Partners, including CanPESC**




- **Guiding Principles**
  1. **Intent and Use**
  2. **Governance**
  3. **Phase Implementation**
  4. **Minimum GEO Code Requirements**
  5. **GEO Code Format**
  6. **Not Accreditation**
  7. **Diploma Mills**
  8. **Sources of Data**
  9. **Matching and Duplication**
  10. **Usage in PESC Approved Standards**
  11. **ACCRAO and Groningen Declaration Network**
  12. **Maintenance**

# Benefits & Use of GEO Codes for learner mobility

- **Examples of the key user benefits of the new GEO Code site include:**
  - Increased ease of user access with interactive interface for institutions/organizations
  - Free and open data standards and documentation for GEO Code access and use
  - Continuous user community data management and access to self-serve features, including API access and CSV file import for new requests/updates to the data set
  - Removal of institution/organization barriers to data comparability and interoperability, strengthening data reliability and aggregate results

# GEO Code Technical Refresh Project & Partner Collaboration

## Project Leads:

- **Matt Bemis,** Associate Registrar, USC & GEO Code User Group Co-Chair
- **Anthony Uljanec,** Senior Director of Technology, ECE
- **Damian Zylski,** Developer, ECE
- **Ann Marie Lyseng,** Senior Manager, ACAT Secretariat/Learner Pathways & GEO Code User Group Co-chair
- **Shawn Pick,** Technical Analyst, ACAT Secretariat/Learner Pathways
- **ACAT Secretariat/Learner Pathways, Alberta Advanced Education**, Data, Testing, User Experience

## Project Delivery:

- 1.0 Development – Oct. 2023-Oct. 2024
- 1.0 Testing June-Sept. 2024
- Planned 1.0 Launch Oct. 2024
- 1.1 Enhancements Oct.- Feb. 2025
- Back end & Front end technology updates for GEO Code site (Azure SQL/Spring Boot, VueJS/Veutify, User & Admin Functionality)
- GEO Code Data Format Guide
- Supporting Guiding Principles
- E.g.: Alberta Transfer Credit Awarded and Transfer System incorporation

# Overview – Technical Refresh Project

- **Back end & Front end technology updates for GEO Code site**
  - **Ease of use for developers**
    - Modern code languages
    - Documentation and API access
    - Azure Cloud for deployment and production
    - High availability data access
- **Data Standards for CSV Import via GEO Code Data Format Guide documentation**

# PESC GEO Code Data Format Guide

**PESC GEO Code CSV File Format Template**

| InstitutionName | AlternateNames1/2/3 | FormerNameGEOCode | InstitutionURL | EstablishedDate | PrimaryCategory | SecondaryCategory | Country | StateProvince | City | Address1 | Address2/3 | PostalCode | Email | Phone | AlternatePhone | Fax | OtherCodeType | OtherCode | GEOCodeStatus | GEOCodeStatusReason | GEOCode | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| M | O | O | O | O | M | O | M | M | M | O | O | O | O | O | O | O | O | O | M | O | M | O |
| U | U | U | U | U | U, R | U, R | U, R | U, R | U | U | U | U | U | U | U | U | U | U | U, R | U, R | S | U |
| 1, 60 | 1, 60 | 7, 7 | 3, 512 | 4, 4 | 1, 60 | 1, 60 | 2, 2 | 5, 6 | 2, 30 | 1, 40 | 1, 40 | 1, 17 | 1, 128 | 1, 14 | 1, 14 | 1, 14 | 1, 19 | 1, 19 | 5, 7 | 1, 80 | 7, 7 | 1, 80 |
| XML: OrganizationNameType<br>GP: MinimumRequirements AND MatchingAndDuplication | XML: OrganizationNameType | XML: GEOCode | XML: URLAddressType | XML: EffectiveDate (Year only) | XML: OrganizationNameType | XML: OrganizationNameType | XML: CountryCodeType<br>GP: MinimumRequirements AND MatchingAndDuplication | ISO: 3166-2<br>GP: MinimumRequirements | XML: CityType<br>GP: MinimumRequirements AND MatchingAndDuplication | XML: AddressLineType<br>GP: MinimumRequirements | XML: AddressLineType | XML: PostalCodeType | XML: EmailAddressType | XML: PhoneNumberType | XML: PhoneNumberType | XML: PhoneNumberExtensionType | XML: OrganizationIDGroup | XML: OrganizationIDGroup | GP: InstitutionStatus | XML: NoteMessage<br>GP: InstitutionStatus | XML: GEOCode<br>GP: GEOCodeFormat | XML: NoteMessage |

PESC GEO Code Format Guide.Fin

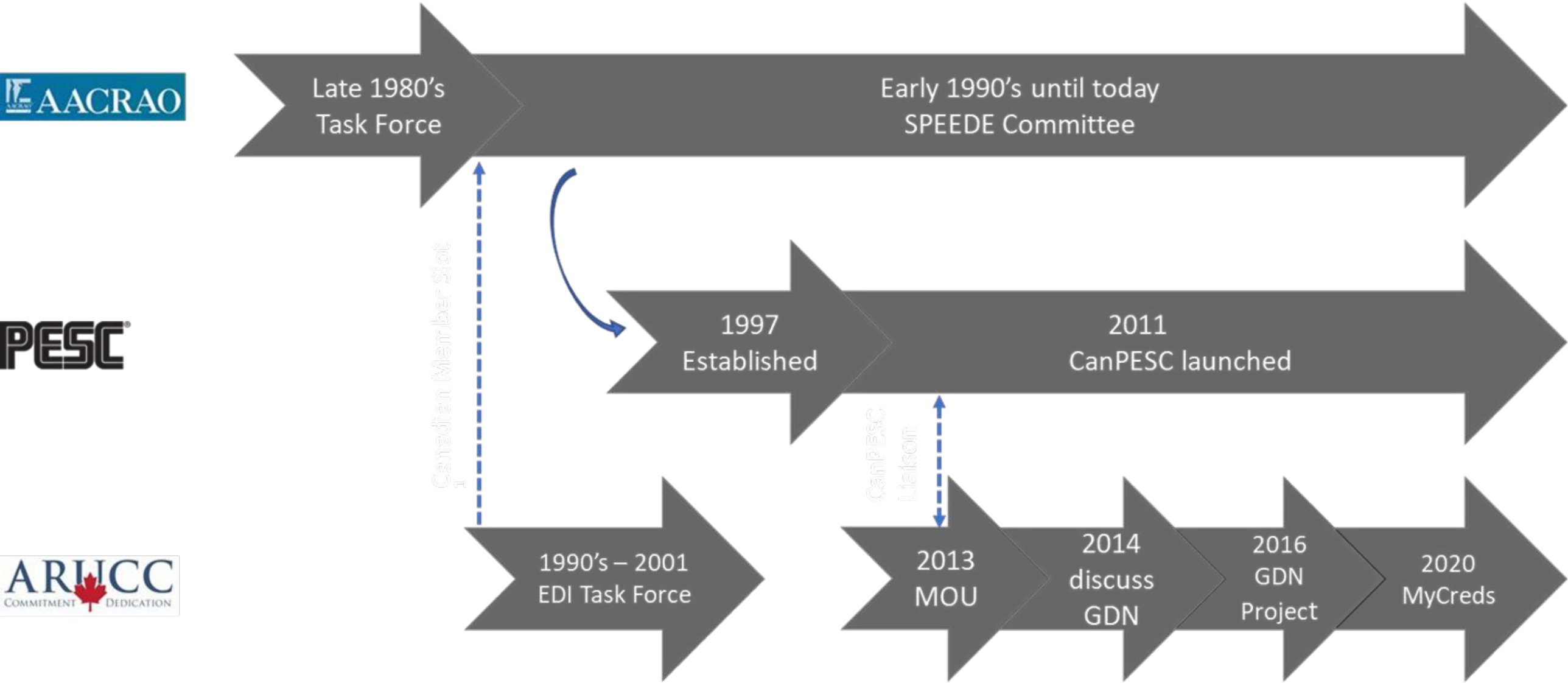
# Platform migration improvements highlighted

- **Current and New GEO Code Website, Search/Tools, Data and Data Standards**
- **New site updates, improved user experience, and updated data standards:**
  - Improved user experience and one targeted search
  - Referential Data (e.g., ISO country and state) and XML transcript standard alignment
  - Interactive interface for suggested edits and new requests
  - Bulk upload/CSV import for edits and new requests
  - CSV data format guide and updated/aligned data standards, documentation, and validation
  - Data Linkage between former GEO Code and New for PSI Name Change
  - Open Self-serve API access
  - Initial data cleaning and planned future data cleaning

# Platform migration improvements remaining timelines:

- Full MVP release for all new platform enhancements (Production environment) expected to be published in February 2025.
- Minor bug fixes that will be resolved in production:
  - Random Signout issues
  - Results returning slowly (search speed greatly improved with Production release)
  - Other minor fixes not mentioned here will be resolved.
  - Full release of updated Data Format Guilde

# A Brief History of CANPESC



# An Overview of CANPESC

- Canadian PESC User Group (*est. 2011*)

- Open, volunteer PESC user group
- Members from Canadian schools, hubs, government, vendors
- Discuss, promote, coordinate and liaise with groups such as:

ARUCC Commitment Dedication

PCCAT Pan-Canadian Consortium on Admissions & Transfer

PESC®

speede

CICIC Canadian Information Centre for International Credentials

TAICEP The Association for International Credential Evaluation Professionals®

- Straddles technical, functional and policy areas across stakeholder members

# Recent Activities

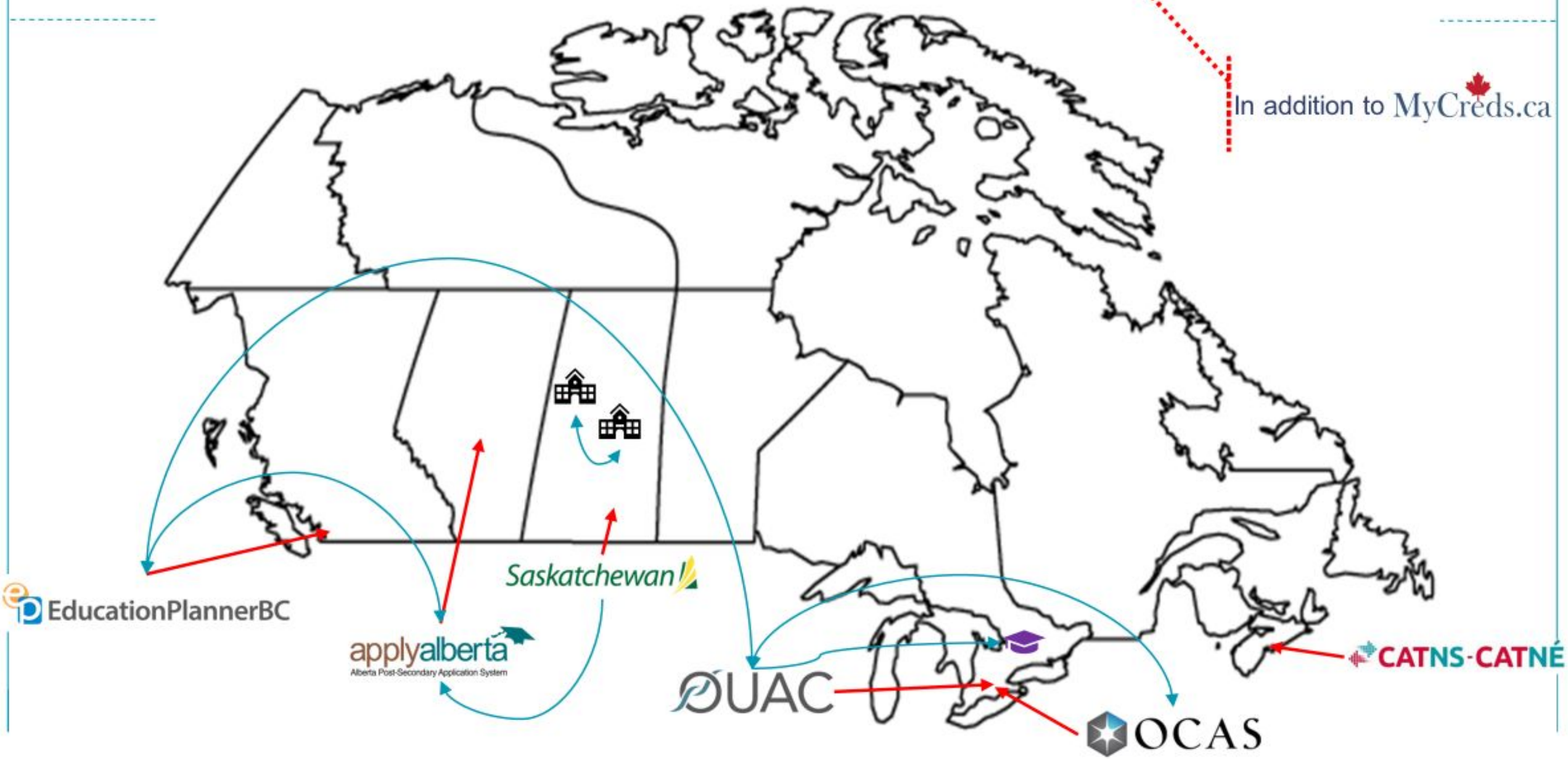
- (Ongoing) Ensure PESC's ***mission*** and ***deliverables***, including approved ***standards***, both supports and incorporates the needs and interests of Canadian stakeholders
  - Members involved with PESC Board, Standards Forum, various Work Groups and Task Forces

- Actively present and promote PESC data exchange at relevant conferences and user groups (e.g., CEUG)

- Resource for community questions
  - Technical, process/procedural and policy

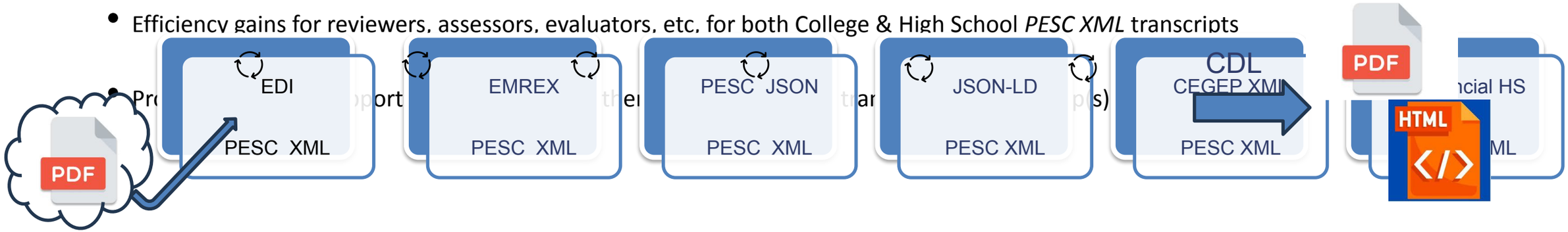
- Collaborate with ARUCC and PCCAT on revised/refreshed Transcript & Transfer Guide

# Canadian PESC (XML & EDI) Data Exchanges



# Challenges & Opportunities

- Lots of *electronic* transcripts, both PDF and data
- Typically, *sender-centric*
  - College & University: PDF formatting obviously varies widely; data does, too – *content* and *order* of mission-critical data
  - High School: layout & content typically provincially mandated but varies between provinces
- Goal: consistent *receiver-centric*, human-readable view for tasks requiring that
- Enter … CanPESC's free & available Common Digital Layout (CDL)
  - Efficiency gains for reviewers, assessors, evaluators, etc. for both College & High School *PESC XML* transcripts
  - Pr[illegible]ort [illegible] tra[illegible]s)



# Common Digital Layout Working Group

- CDL Working Group established in June-2019 to develop options to address interest by members to digitally display electronic transcript data in a consistent manner
- Primary goal of reducing the effort for other institutions to implement a transcript-to-pdf solution
- The working group is comprised of volunteers from various Canadian provinces

Jennifer Kitching, Council on Admission & Transfer for Nova Scotia (CATNS)

Ben Harper, Application Centre for Ontario's Public Colleges (OCAS)

Cathy van Soest, Education Planner BC

Ruth Blades (Retired, CATNS)

Joseph Minichini, University of Toronto

# Future Directions

- Update schemas for the newest version of the ColTrn and HSTrn
- The CDL working group will start to think about how we could work with or transform JSON-LD Transcript
- Marketing: Are there any other beneficial places to display a link to background and context information for the implementation of the CDL so that institutions and organizations are aware of its existence (link on PESC website, ARUCC Transcript and Transfer Guide site)

# PESC JSON-LD Transcript

# AACRAO SPEEDE College Transcript

- AACRAO SPEEDE/ANSI EDI Transcript standard 1990
- SPEEDE EDI Transcript in wide use today
- EDI is rigid and minimally extensible

# PESC XML College Transcript

- PESC XML Transcript standard released on 2004
- XML Transcript standard has been maintained and updated since 2004
- Some higher education use in the US
  - Have seen interest at the state level to facilitate state-wide transfer
    - Indiana
    - SUNY
- Wider use in Canada
- Used by many organizations to trade transcript or transcript-like data
  - ECE embedded a PESC XML version of their evaluation report in PDF

# Recent History

- Workgroup began in January 2021 discussing and developing a JSON version of the PESC transcript standard
- Created utility to translate PESC XML transcript to JSON
- Along came W3C Verifiable Credentials - a JSON-LD construct

# W3C Verifiable Credentials

- Issue tamper-proof certificates, degrees, and academic records.
- Employers and institutions can instantly verify student achievements without contacting issuers.
- Students control what data they share (e.g., only their degree, not full transcript).
- Works with digital wallets and integrates with decentralized identity systems (DIDs).
- Automates verification processes, saving time for registrars and admissions.
- Credentials can be continuously updated, tracking certifications, degrees, and skills over time.

# Benefits of JSON-LD

- Reduces data size, enabling faster transmission and processing.
- Easy to read and write, integrating seamlessly with web technologies and APIs.
- Compatible with decentralized systems (like DIDs) and digital wallets.
- Facilitates possible linking academic programs and courses.
- Verifiers can validate data without contacting the issuing institution.
- Students can share only necessary data, ensuring privacy.
- Easily adaptable for emerging standards and technologies, such as blockchain credentials.

# PESC JSON-LD Standard Components

- Tabular Application Profile (TAP)
- Context File
- SHACL (Shapes Constraint Language) Specification
- JSON-LD Instances/Test Cases
- Diagrams
  - Simple Overview
  - Technical Overview
  - Detailed Model
- Implementation Guide

# Tabular Application Profile

- Based on DublinCore Tabular Application Profile (DCTAP) model
- Spreadsheet converted to CSV file
- CSV used to generate Context File and SHACL specification
- Tabs
  - “namespaces” - defines prefixes
  - “tap” - ties shapes to properties
  - “shapes” - defined shapes
  - “properties” - defines properties
  - “allowed values” - defined allowed values for code sets

# “namespaces” tab

| | | |
|---|---|---|
| rdfs | http://www.w3.org/2000/01/rdf-schema# | RDF Schema |
| xsd | http://www.w3.org/2001/XMLSchema# | XSD: use for data types |
| ex | http://example.org/ | example |
| ceds | http://ceds.ed.gov/owl# | Common Education Data Standards |
| ceterms | https://purl.org/ctdl/terms/ | Credential Transparency Description Language |
| dc | http://purl.org/dc/elements/1.1/ | Dublin Core Metadata Element Set, Version 1.1 |
| dct | http://purl.org/dc/terms/ | DCMI Metadata Terms |
| elm | http://data.europa.eu/snb/model/elm/ | European Learning Model |
| foaf | http://xmlns.com/foaf/0.1/ | Friend of a Friend |
| sdo | https://schema.org/ | Schema.org |
| skos | http://www.w3.org/2004/02/skos/core# | Simple Knowledge Organization System |
| pesc | https://pesc.org/terms/ | DOES NOT EXIST |
| cred | https://www.w3.org/2018/credentials# | W3C Verifiable Credentials |
| pescAcademicSummaryLevels | https://pesc.org/vocabs/AcademicSummaryLevels# | DOES NOT EXIST |
| pescAcademicSummaryTypes | https://pesc.org/vocabs/AcademicSummaryTypes# | DOES NOT EXIST |
| pescAcademicProgramTypes | https://pesc.org/vocabs/AcademicProgramTypes# | DOES NOT EXIST |
| pescAcademicAwardLevels | https://pesc.org/vocabs/AcademicAwardLevels# | DOES NOT EXIST |
| pescAgencyCodes | https://pesc.org/vocabs/AgencyCodes# | DOES NOT EXIST |
| pescConditionsMetCodes | https://pesc.org/vocabs/ConditionsMetCodes# | DOES NOT EXIST |

# “tap” tab

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 225 | AcademicAwardShape | pesc:academicCompletionIndicat | Academic Completion Indica | FALSE | FALSE | Literal | xsd:boolean |
| 226 | AcademicAwardShape | pesc:academicCompletionDate | Academic Completion Date | FALSE | FALSE | Literal | xsd:date |
| 227 | AcademicAwardShape | pesc:academicHonors | Academic Honors | FALSE | TRUE | IRI BNODE | |
| 277 | AcademicAwardShape | pesc:academicDegreeRequireme | Academic Degree Requirem | FALSE | TRUE | IRI BNODE | |
| 136 | AcademicDegreeRequirementSha | pesc:urlAddress | URL Address | FALSE | FALSE | Literal | xsd:anyURI |
| 278 | AcademicDegreeRequirementSha | pesc:thesisDIssertationTitle | Thesis Dissertation Title | FALSE | FALSE | Literal | xsd:string |
| 279 | AcademicDegreeRequirementSha | pesc:thesisDissertationAdvisor | Thesis Dissertation Advisor | FALSE | FALSE | Literal | xsd:string |
| 280 | AcademicDegreeRequirementSha | pesc:_URLAddress | URL Address 2 | FALSE | FALSE | Literal | xsd:anyURI |
| 230 | AcademicHonorsShape | pesc:HonorsTitle | Honors Title | FALSE | FALSE | Literal | xsd:string |
| 231 | AcademicHonorsShape | pesc:honorsLevel | Honors Level | FALSE | FALSE | IRI | |
| | AcademicProgramShape | pesc:hasCourse | Has Course | FALSE | TRUE | IRI BNODE | |
| | AcademicProgramShape | pesc:hasSession | Has Session | FALSE | TRUE | IRI BNODE | |
| | AcademicProgramShape | pesc:offeredBy | Offered By | TRUE | FALSE | IRI BNODE | |
| 233 | AcademicProgramShape | pesc:programSecondarySchoolCc | Program Secondary School ( | FALSE | FALSE | IRI | |
| 235 | AcademicProgramShape | pesc:programCIPCode | Program CIP Code | FALSE | FALSE | Literal | xsd:string |

# Context File

- Generated from TAP
- Ensures semantic clarity and interoperability
- Provides mappings between JSON keys and IRIs (Internationalized Resource Identifiers) to link data to standardized vocabularies (schemas)
- Schema hierarchy
  - PESC
  - CEDS
  - Credential Engine
  - Schema.org


```
@context": {
 "@vocab":"https://pesc.org/terms/",
 "sh":"http://www.w3.org/ns/shacl#",
 "rdf":"http://www.w3.org/1999/02/22-rdf-syntax-ns#",
 "rdfs":"http://www.w3.org/2000/01/rdf-schema#",
 "xsd":"http://www.w3.org/2001/XMLSchema#",
 "ex":"http://example.org/",
 "ceds":"http://ceds.ed.gov/owl#",
 "ceterms":"https://purl.org/ctdl/terms/",
 "dc":"http://purl.org/dc/elements/1.1/",
 "dct":"http://purl.org/dc/terms/",
 "elm":"http://data.europa.eu/snb/model/elm/",
 "foaf":"http://xmlns.com/foaf/0.1/",
 "sdo":"https://schema.org/",
 "skos":"http://www.w3.org/2004/02/skos/core#",
 "pesc":"https://pesc.org/terms/",
 "cred":"https://www.w3.org/2018/credentials#",
 "pescAcademicSummaryLevels":"https://pesc.org/vocabs/AcademicSummaryLevels#
 "pescAcademicSummaryTypes":"https://pesc.org/vocabs/AcademicSummaryTypes#",
 "pescAcademicProgramTypes":"https://pesc.org/vocabs/AcademicProgramTypes#",
 "pescAcademicAwardLevels":"https://pesc.org/vocabs/AcademicAwardLevels#",
 "pescAgencyCodes":"https://pesc.org/vocabs/AgencyCodes#",
 "pescConditionsMetCodes":"https://pesc.org/vocabs/ConditionsMetCodes#",
```

# SHACL Specification

- Generated from TAP
- Shapes Constraint Language (SHACL) file helps validate, constrain, and describe the structure and semantics of the JSON-LD data
- Captured in Terse RDF Triple Language (Turtle)
- Turtle favored for readability and ease of use when defining RDF triples

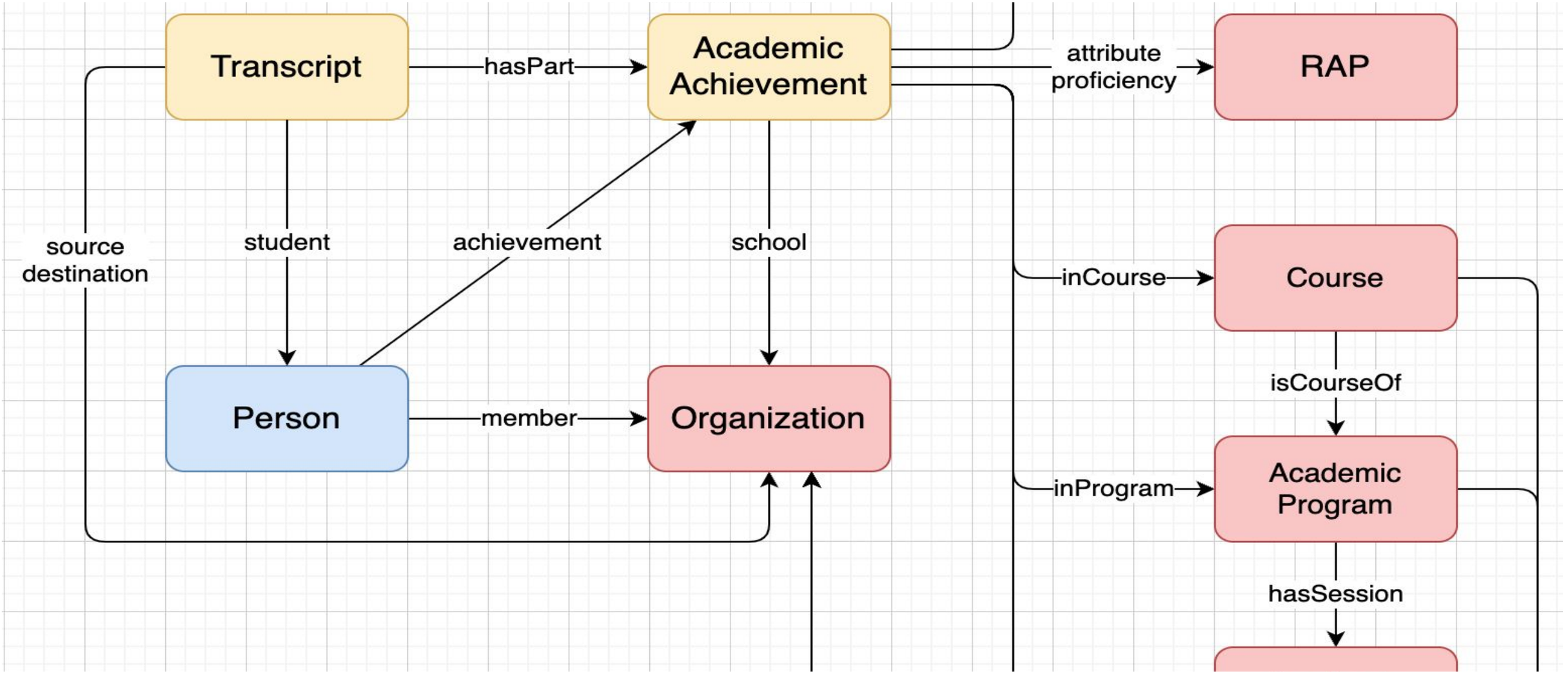
```
<AcademicAwardShape> a sh:NodeShape ;
    sh:closed false ;
    sh:name "Academic Award"@en ;
    sh:property <academicawardshapeAcademicAwardDate>,
        <academicawardshapeAcademicAwardLevel>,
        <academicawardshapeAcademicAwardProgram>,
        <academicawardshapeAcademicAwardTitle>,
        <academicawardshapeAcademicCompletionDate>,
        <academicawardshapeAcademicCompletionIndicator>,
        <academicawardshapeAcademicDegreeRequirement>,
        <academicawardshapeAcademicHonors> ;
    sh:targetClass pesc:AcademicAward .

<AcademicRecordShape> a sh:NodeShape ;
    sh:closed false ;
    sh:name "Academic Record"@en ;
    sh:targetClass pesc:AcademicRecord .
```

# JSON-LD Instances/Test Cases

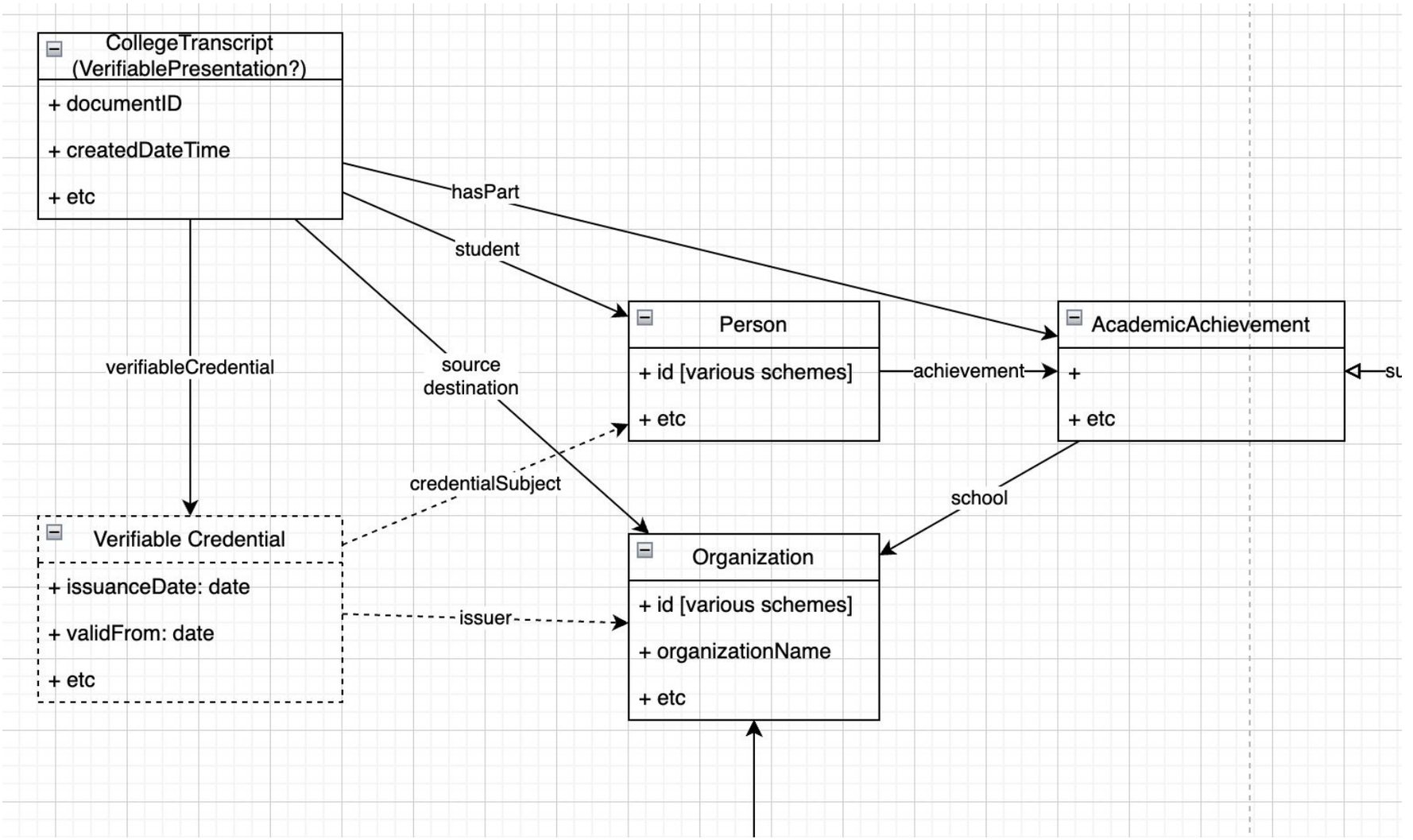
- Instance documents cover all classes and properties
- Multiple documents since some classes and properties may be incompatible
- Test cases would be seeded with errors


```
{
  "@context": "https://raw.githubusercontent.com/pesc-org/json-ld-transcri
  "@graph": [
    {
      "@id": "transcripts/050330001",
      "@type": "CollegeTranscript",
      "createdDateTime": "2023-05-08T14:17:29-05:00",
      "destination": "https://example.edu/Destination#id",
      "documentID": "050330001",
      "documentTypeCode": "pescDocumentTypeCodes:RequestedRecord",
      "hasPart": [
        "achievement001"
      ],
      "source": "https://example.edu/Source#id",
      "student": "https://people.pjjk.net/test",
      "transmissionType": "pescTransmissionTypes:Original"
    },
    {
      "@type": "Person",
      "@id": "https://people.pjjk.net/test",
      "achievement": [
        "achievement001"
      ],
```

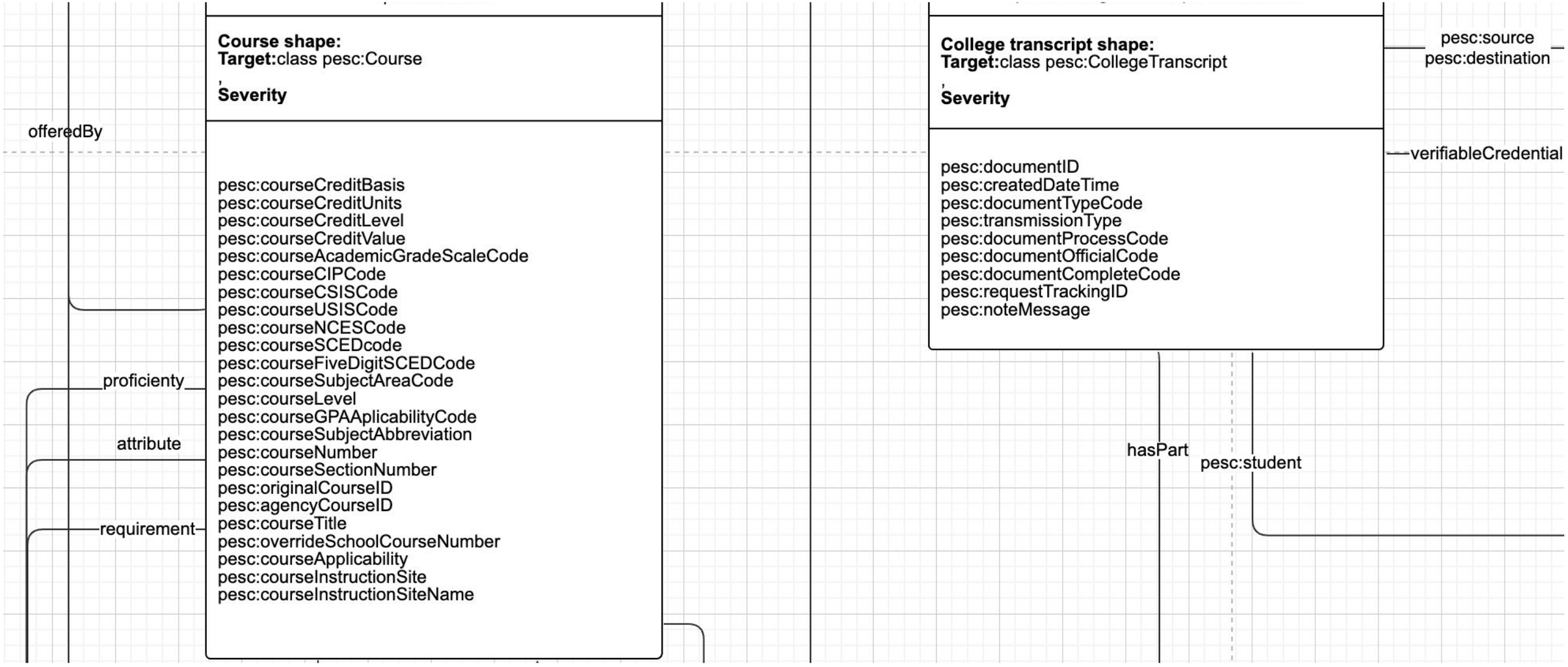
# Simple Overview



# Technical Overview



# Detailed Model



# Guiding Principles

- Utilizing existing standards where possible
  - CEDS (Common Education Data Standards)
  - CTDL (Credential Transparency Description Language)
  - Schema.org
- Using existing standards lessens demand on PESC to maintain code lists and structures
- Where no corresponding code exists in CEDS or CTDL, PESC will maintain the necessary codes
- Maintaining the basic structure of the previous PESC transcript standards

# Current Status

- Discussing how an Implementation Guide will be created
  - Supports the more functional users of the standard
  - Will be dedicated to describing the nature of the graph that JSON-LD provides
- Have reviewed Course, Term, Test and Language sections

# Next Steps

- Review Sections
  - Academic Awards
  - Additional Student Achievements
- Testing and review of the JSON-LD standard
- Create Implementation Guide

# Examples (if time allows)

- PESC Transcript TAP
- Context File
- SHACL Specification
- Minimal JSON-LD Example
- Technical Overview
- Detailed Model

# Questions?

# OCTOBER 2024 DATA SUMMIT


PESC

Hyatt Regency Orange County, CA
October 16-17, 2024